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ABSTRACT

A study was conducted to identify the factors that influence electronics technicians to participate in work-related training and to explain the relationships among those factors. Questionnaires were mailed to 130 randomly selected electronics technicians in Oregon in March 1988; 47 technicians responded. Multiple regression and partial correlation were employed to verify the proposed causal model. The study found that electronics technicians' participation in work-related training was influenced by their willingness and ability to participate. Their willingness to participate in work-related training was determined by their job satisfaction and external expectations. Reducing restrictions on participation, providing flexible time to attend, and paying for training costs were effective ways of increasing technicians' ability to attend, and, therefore, of encouraging them to participate in work-related training. (88 references) (KC)

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FACTORS WHICH INFLUENCE ELECTRONICS TECHNICIANS TO PARTICIPATE IN WORK-RELATED TRAINING

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FACTORS WHICH INFLUENCE ELECTRONICS TECHNICIANS TO PARTICIPATE IN WORK-RELATED TRAINING

INTRODUCTION

The purpose of this study was to identify the factors that influence electronics technicians to participate in work-related training and to explain the relationships among those factors. Two questions were addressed. What factors will influence electronics technicians to participate in work-related training? What are the relationships among these factors?

METHODOLOGY

Questionnaires were mailed to 130 randomly selected electronics technicians in the State of Oregon during March 1988. Forty-seven electronics technicians responded. Multiple regression and partial correlation were employed to verify the proposed causal model.

FINDINGS AND CONCLUSIONS

It was concluded that electronics technicians' work-related training participation was influenced by their willingness and ability to participate. Their willingness to participate in work-related training was determined by their job satisfaction and external expectations. Reducing restrictions on participation, providing flexible time to attend, and paying for training costs were effective ways of increasing their ability to attend, and, therefore encouraging them to participate in work-related training.

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INTRODUCTION

The purpose of this study was to identify the factors that influence electronics technicians to participate in work-related training and to explain the relationships among those factors.

Education and training are among the most important enterprises in modern society. There is no clear-cut boundary between education and training. According to Hill (1982), "Education deals a great deal with the acquisition of knowledge; training deals with the application of knowledge"(p.273). Every individual has been exposed to some training situations if one includes the skill development activities of early schooling (Deming, 1982).

Although there are many different definitions of training, the definitions most often used by the public to explain training are similar. Training usually refers to the communication and learning of the manual skills necessary to perform an economic task. It is usually a presentation of controlled information and practice resulting in performance of criterion behavior by the learner in a manner which allows evaluation (Geroy, 1986; Johns-Manville, 1976). Over the years, training has come to include a broader spectrum of activities, ranging from skill training to individual development to organizational change (Otto & Glaser, 1970). More recently, training has become a process of preparing people to perform defined functions in predictable situations. In this way "training" differs from education, which is a process of equipping people to perform undefined functions in unpredictable situations (Hill, 1982).

Today, workers are viewed as assets that enable enterprises to distinguish themselves in performance. Workers are more than mere current resources used in production processes. They have long economic lives which for the corporations' best interest deserve the same attention given to other assets (Vetter, 1967).

This recognition that people constitute a company's critical resource is creating a boom in corporate training. It is estimated that corporations annually spend nearly $60 billion on training, about the same amount spent on education in the nation's four-year colleges and universities (Eurich & Boyer, 1985). About eight million people, the same number as are enrolled in institutions of higher education, are involved in training within corporations (Eurich & Boyer,

1985; Naisbitt & Aburdene, 1985). These figures indicate that human resources could be the single most critical resource for public and private enterprises in the 1980s and 1990s. Other factors affecting this present pivotal position of human resources are the slowdown in the growth rate of the labor force and increasing occupational obsolescence in the workplace (Tracy, 1984).

Because the use of technology in the workplace is growing exponentially, training workers to utilize this technology is ongoing. Twenty years ago, computers were built with thousands of individual transistors, which all had to be connected manually. Today, an entire microprocessor can be put on a tiny silicon chip (Resources in Technology, 1987; Weisbecker, 1979). Predicting the impact of scientific breakthroughs on the future is difficult. As basic research provides greater knowledge, engineers steadily apply it to existing problems. Such applications inevitably have broad implications for the production procedures, methods, and even the products (Bulkeley, 1986). The need for training is greater in organizations whose products and services are based on rapidly changing states of the art or which have to maintain an up-to-date technology (Bracker & Pearson, 1987; Warren, 1969).

With the application of computers, the electronics industry has expanded its service scope to many high-technology fields (Rodenstein, 1983). According to occupational employment projections (U.S. Department of Labor, 1984), the electronics industry will be among the twenty fastest growing areas from 1988 through 1995. The electronics industry is approaching a $400-billion business. Parnell (1986) predicted that within two years 75 percent of all jobs in the electronics industry would involve computers in some capacity. The U.S. Department of Labor (1984) also estimated that 115,000 new electronics technicians, or a 60-percent increase, would be needed between 1986 and 1987 in addition to replacements of older workers.

Due to dramatic technological changes, electronics technicians become outdated in both skills and knowledge after working for only five to seven years (Hubbard, 1986). It has been estimated that a person's knowledge degenerates by 5 percent each year, and only 50 percent of useful knowledge remains 10 years later if advanced knowledge is not sought after (Chang, 1985). To become

successful, electronics technicians must continually broaden their knowledge and sharpen their skills through "work-related training" (Iversen, 1986). As the rate of technological change increases, the importance of work-related training increases.

Work-related training in general refers to those kinds of knowledge and skills that need specialized learning procedures in the workplace. This includes in-plant training, in-house training, in-company training, on-the-job training and inservice training (Hawes & Hawes, 1982; Husen & Postlethwaite, 1985; Page, Thomas & Marshall, 1980; Rowntree, 1982). Work-related training is aimed at making workers more productive in their work and has been considered as a cost-effective approach to upgrading workers' knowledge and skills to match production needs (Barton, 1986; Burns, 1980; Chang, 1985; Hubbard, 1986; Rowntree,1982). Work-related training has been adopted by most industries, especially by the highly technological corporations.

Some highly technological companies may soon budget 15 to 20 percent of the current cost of personnel towards work-related training (Barton, 1986; Zahniser, Schler & Ashley, 1984). It has been estimated that 73 percent of all U.S. enterprises with 50 or more employees offered some sort of technical training or work -related training at cost to the companies (Zemke, 1985). Most work-related training has operated under agreements between industries and universities in the form of scholarships or educational support for workers.

In response to rapid technological challenges, electronics companies are investing in new equipment and facilities, and providing work-related training for their employees. Work-related training is believed to raise communication standards among technicians, employers, and customers and has been considered to be one of the most effective ways of coping with technological changes in the industry.

Statement of The Problem

The electronics industry is one of the most important subsystems of the information society. Parnell (1986) predicted that the electronics industry will be one of the fastest growing industries from 1988 through 1995. Any marked

change due to technological innovation creates servere problems of adjustment for electronics technicians (Stern, 1988). Thus, work-related training offered to them has increased dramatically (Zemeke, 1986). However, for this training to be effective, it must be appropriate. Electronics technicians must benefit from this training and be able to apply it in the work environment. The effectiveness of such training, however, is also contingent upon their motivation or willingness to participate.

Previous studies attempted to explain and predict workers' motivation to participate in many aspects of further education (Boshier, 1971; Boshier & Collins, 1985; Burgess, 1971; Dean, 1986; Houle, 1961; Yarger, Brannigan & Mintz, 1980). These were not multivariate studies; they usually considered only a few variables at a time. Furthermore, work-related training of electronics technicians as a group has not been studied. The identity of factors that may influence these particular workers to participate in work-related training, and how significant these factors may be, are still unknown.

Therefore, this study addressed the following questions: What factors will influence electronics technicians to participate in work-related training? Furthermore, what are the relationships among these factors? An understanding of the factors that influence electronics technicians to comprehend and assimilate work-related training will help electronics companies to design and deliver technical training programs more effectively. These training programs will then be more effective in improving productivity and will help electronics technicians pursue individual excellence.

Definition of Terms

Electronics technicians are those who are employed in the manufacturing of electronics equipment, including those in occupations classified in the Dictionary of Occupational Title as "electronics technicians" (workers applying electronics-related knowledge to lay out, build, test, troubleshoot, repair, and modify developmental and production electronics equipment, such as computers, missile-control instrumentation, and machine tool numerical controls) (Oregon Industrial Outlook, 1986; U.S. Department of Labor, 1977).

Inservice training is special training or instruction for employed persons, including professionals, aimed at increasing workers' competence. It is a training undertaken during a break in professional service or in conjunction with it (Good, 1959; Page, Thomas & Marshall, 1980).

In-plant training is a program of training established, financed, and operated by an industry concerned with training for workers. It is training for the employees of an organization held on the premises (Good, 1959; Page, Thomas & Marshall, 1980).

On-the-job training involves supervision and other supplemental instruction furnished to workers while they are employed as beginners or trainees in the regular duties of positions or jobs for which wages are paid (Good, 1959). It is also training in the skills of an occupation while the individual is actually carrying out the work of an employed position (Hawes & Hawes, 1982).

REVIEW OF RELATED LITERATURE

Motivation and Behavior

There are as many definitions of motivation as there are theories of motivation. The definitions of motivation have varied with the development of motivation theories. The term "motivation" was originally derived from the Latin word "movere," which means "to move." In the 1960s and 1970s, motivation was concerned with what energizes human behavior, what directs or channels behavior, and how this behavior is maintained or sustained (Steers & Porter, 1983). Motivation refers to what a person is willing to do (Schaefer, 1977). It consists of the contemporary influences on the direction, vigor, and persistence of action (Atkinson, 1964). Motivation activates and directs behavior toward goals (Berelson & Steiner, 1964). People seem inclined to do that which they value or view as helping them to achieve what they value (Sredl & Rothwell, 1987).

According to the Expectancy Theory (Vroom, 1964), a person is motivated to obtain a particular outcome, the importance of which varies with the value attributed to these outcomes. Furthermore, the higher a person's expectation of receiving some incentives or rewards, whether a promotion or a good grade, the

harder he or she will work for it.

Expectation is the perception of likelihood of success at the task (Biglan & Mitchell, 1971; Nebeker & Mitchell, 1973; Rossett,1987). If one believes that hard work leads to success, and success leads to recognition, and recognition leads to valued reward, then he or she must be a motivated worker (Michalak & Yager, 1979). Expectation can influence the way a person actually does perform.

The thesis that expectation influences behavior has substantial research support (Cooper, 1983; Elashoff & Snow, 1971; Martinèk, Crowe & Rejeski, 1982; Rosenthal & Jacobson, 1968). Rosenthal and Jacobson (1968) examined 300 studies of the effects of expectations on behavior. Of these, 37 percent of the studies found that expectations seemed to influence behavior. Since expectations are affirmations of the future, it may be possible to meet an expectation if proper action is taken by the worker. Companies can perpetuate workers' actions through creating a perception of the environment which holds possibility for worker success. Management personnel who perceive their workers as having value and worth, in turn, stimulate self-motivated workers (Baxter & Bowers, 1985).

In addition to expectation, the Vroom's Expectancy Theory identifies "value" as another variable that affects motivation. Psychologists have defined "value" in various ways. Value is what one regards as conducive to one's welfare (Locke, 1976). Value is viewed as the worth individuals attach to things or outcomes (Rogers, Clark & Schuster,1971; Rossett, 1987). Value is an important element in an individual's frame of reference which guides actions and perceptions (Pennings, 1970). Value is also considered to be part of the normative standards used to judge and to choose among alternative modes of behavior (Becker & McKlintock, 1967; Elizur, 1984; Kluckhohn, 1973). Based upon these definitions, if workers view themselves as having meaningful duties, they are more likely to make a commitment to the company.

As discussed above, both expectation and value appear to influence motivation (Keller, 1983; Nadler & Lawler, 1979). The Expectancy Theory is a concrete representation of this idea. In this theory, human behavior is a function of the interactive processes between the characteristics of an individual and the perceived environment (Steer & Porter, 1983). People have their own needs and

mental maps of what the world is like. They use these maps to make decisions about how they will behave (Nadler & Lawler, 1979). In short, motivation is a function of expectation and value. As value and expectation change, so does motivation.

Although expectation and value have been widely used to explain motivation, Vroom's Expectancy Theory is a simple formulation that encompasses a highly complex and poorly understood set of variables and variable dynamics (Campbell & Pritchard, 1979). Research indicates that the value and expectation factors may not be sufficient to explain motivation (Boshier & Collins, 1985; Keller, 1983). As proposed by Keller (1983) and Boshier and Collins (1985), values and internal expectations and external expectations exist independently. In addition, the Expectuancy Theory ignored important factors such as job satisfaction, attendance ability and personal characteristics.

The Steers and Rhodes Process Model

Steers and Rhodes (1978) proposed a process model that extends Vroom's Expectancy Theory. The process model suggests, as does Vroom, that "motivation" influences an employee's attendance behavior (Figure 1). Unlike Vroom (1964), however, an employee's values do not directly influence attendance behavior; they affect the person's motivation indirectly through satisfaction with the job situation. Rather than values, a person's ability to attend training in conjunction with motivation will influence attendance behavior. In this regard, attendance motivation is influenced by both job satisfaction and various internal and external pressures to attend.

Furthermore, Steers and Rhodes (1978) argue that at least three other variables could affect attendance ability. These variables are (a) illness and accidents,(b) family responsibilities, and (c) transportation problems. Regardless of a worker's motivation to go to work, these variables could still prevent a person from attending. Other researchers, however, think that time and cost of training may be the major barriers for workers to participate in work-related training (Hamilton & McElroy, 1983; Henich, 1987; Keyser, 1977; Theis, 1981). In a study titled "What motivates teachers to sign up for in-service courses?"

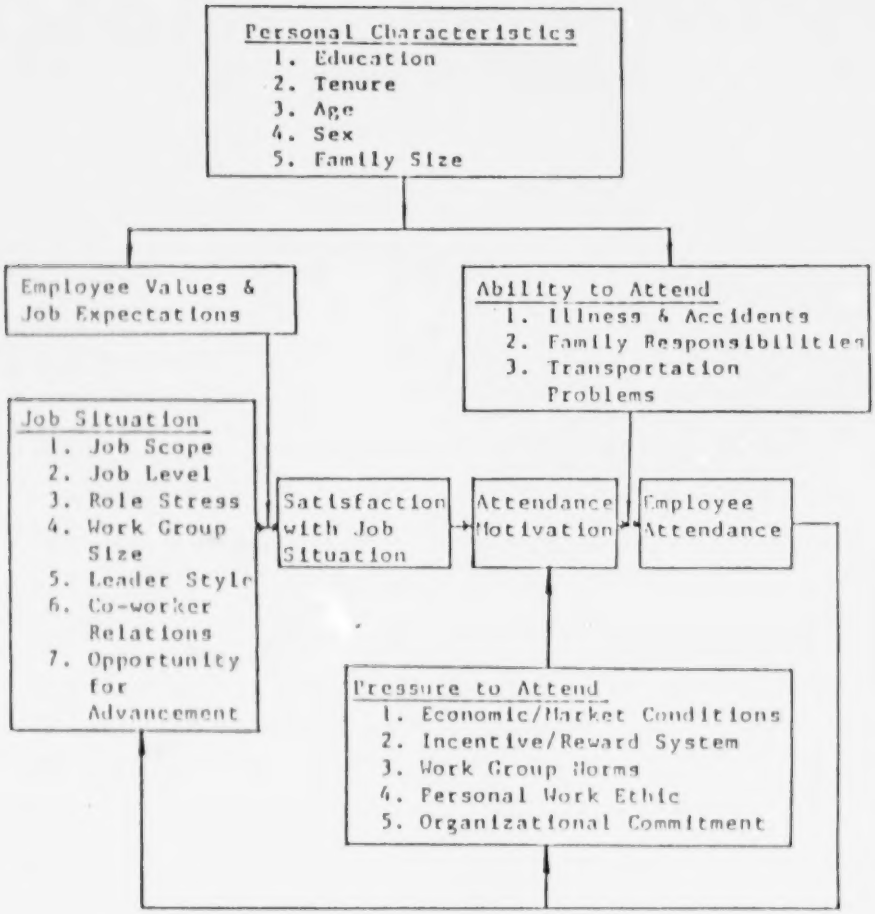

Figure 1. The Steers and Rhodes Process Model.

Yarger, Brannigan and Mintz(1980) found that the distance from home to the place of training was very important.

Motivation, in the Steers and Rhodes process model, is the most significant factor that is directly related to training participation. This point is also supported by Dean's (1986) study. In this study, Dean found that willingness or motivation to participate was the major factor that influenced workers to participate in education and training programs (p. 35).

Examining the psychological variables reported in Steers and Rhodes' paper leads to two propositions. First, the Steers and Rhodes process model defines internal expectations as employee values and job expectations. Secondly, this model defines external expectations as pressure to attend an activity. These concepts are consistent with the viewpoints of Boshier and Collins (1985), Dean (1986), and Keller (1983). Expectation is composed of internal and external facets (Boshier & Collins, 1985; Keller, 1983). Internal expectations include cognitive interest, social interest, escape and stimulation, and professional advancement. External expectations include the influence of significant others and the adoption of new technology in the workplace (Boshier & Collins, 1985; Houle, 1961). In Dean's (1986) study, the general feeling of hope regarding participation may be classified as values and internal expectations; the encouragement of significant others and program benefits may be classified as external expectations (p. 35).

Interaction may exist between values and internal expectations and external expectations. Values and internal expectations influence the demand for and utilization of work-related training opportunities by workers. In addition to supervisors' expectations, providing employees opportunities to participate in work-related training may become a reality. The idea that external expectations influence behavior is argued by Rosenthal and Jacobson (1968). Thus, through the mechanism of the Pygmalion Effect, supervisors' expectations may serve as a powerful influence on the willingness of employees to participate in work-related training (Baxter & Bowers, 1985).

Values and internal expectations, external expectations, and job satisfaction factors all seem to influence the motivation of employees to participate in

work-related training. Highly motivated employees seem more likely to have higher training participation than those who are less motivated. Training participation, however, seems not only influenced by the motivation factor, but is also influenced by attendance ability.

The pressure-to-attend variable in the Steers and Rhodes process model, is an important dimension of external expectations. Employees' values and job expectations are also part of internal expectations. Certain parts of a job situation combine to become both internal and external expectations. For example , the opportunity to advance belongs to internal expectations; co-worker relations belongs to external expectations according to current psychological arguments (Boshier & Collins, 1985; Keller, 1983).

Job satisfaction is a pleasurable or positive emotional state resulting from the appraisal of a workers' job or job experiences (Locke, 1976). Basically, job satisfaction refers to a set of attitudes that employees have about their jobs (Schultz, 1982). It has been linked to motivation, productivity, and even general life satisfaction (Landy, 1978).

Personal characteristics that are important to employees' attendance are education, tenure, age, and sex. Education or formal educational attainment is an important subset of personal characteristics when considering employees' attendance possibilities (Caras, 1985; Carson, 1985; Hermosa, 1986; McKenna, 1984; Roldan, 1986). Research indicates that there esists a relationship between formal educational attainment and continuing education participation (Hermosa, 1986; Roldan, 1986).

Tenure or number of years in the profession might be the most significant influence when considering employee's work-related training attendance (Caras, 1985; Carson, 1985; Hermosa, 1986; Roldan, 1986). In Japan, work-related training is one of the most important components of the long-term orientation of Japanese personnel planning (Takezawa, 1983). Japanese companies use such opportunities as rewards and incentives for the promising workers. Major considerations in sending employees for work-related training, especially on sabbatical leave, are influenced by tenure or work experiences (Westney & Sakakibara, 1986). This concept is supported by Keller (1983) and Friedman and Yarbrough (1985).

Age is a significant dimension when considering employees' work-related training attendance (Caras, 1985; Carson, 1985; McKenna, 1984; Roldan, 1986). Furthermore, research indicates that the aggressive and energetic youth with recent technical training can cause the middle-aged to feel threatened or obsolete, and, furthermore, motivates them to seek continuing education or training (Morgan, Patton & Baker, 1985).

Sex has been found to be an important subset of personal characteristics when considering employees' attendance ability (Caras, 1985; Carson, 1985; McKenna, 1984). Numbers of woman workers have increased significantly in the working force. It may not be a worker's sex that relates to job satisfaction but rather a group of factors that varies with sex (Schultz, 1982).

The Steers and Rhodes process model was applied by watson (1981). Watson (1981) simplified the Steers and Rhodes model by removing some factors such as pressure to attend and attendance motivation. The independent variables were personal characteristics, job situation, and job satisfaction; the dependent variable was employees' attendance. A major finding of Watson's (1981) study was that job satisfaction (shift, supervisor, pay, promotion, co-workers) was not a major influence on attendance. Furthermore, absence from work was significantly related to variables that included personal characteristics (own house, sex, age, marital status, number of children) and job situation (shift, tenure, other employment). The proposed causal model of work-related training participation for electronics technicians is shown in Figure 2.

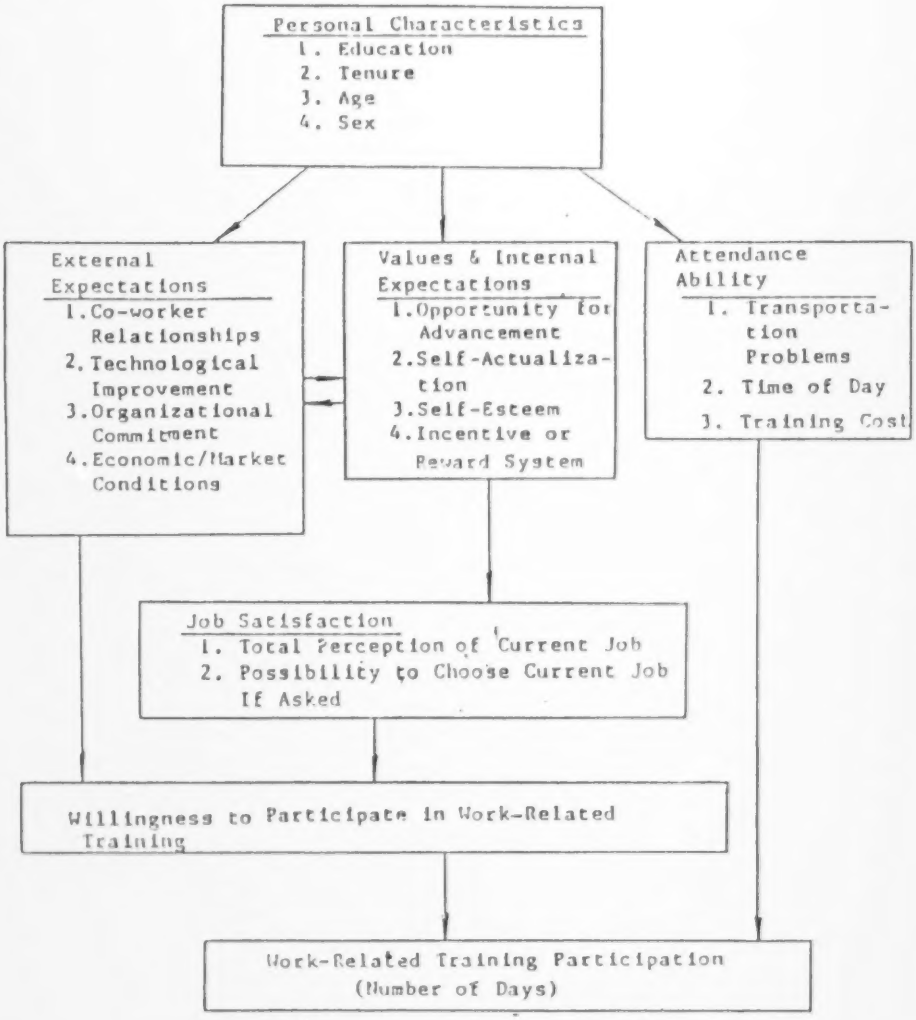

Figure 2. A Proposed Conceptual Model of Work-Related Training Participation for Electronics Technicians.

METHODOLOGY

An instrument was developed to answer the research questions. Full-time electronics technicians in electronics companies in the State of Oregon formed the population in this study. Questionnaires were mailed to 130 Oregon electronics technicians who were randomly selected from the 1987-1988 Directory of Oregon Manufacturers.

The response rate for the sample was 41 percent. The coefficients of internal consistency (Cronbach Alpha) ranged from .60 to .82 for the factors that consisted of more than one item.

The levels of significance used in this study were .10 for regression analysis. Path analysis was the major statistical technique for testing the causal model. Standardized regression coefficients were used to depict the influence from one factor to the next factor since different scales and units were used for different factors. The unpredicted linkages were tested by partial correlations.

The above statistical analyses were accomplished by utilizing the Statistical Package for the Social Sciences (Nie, Hull, Jenkins, Steinbrenner & Bent, 1975) available in the Milne Computer Center at Oregon State University.

FINDINGS

The direct relationships among the seven factors proposed by this study were expressed by six causal equations. These causal equations were used to test the predicted direct relationships among factors in the proposed model. Six verified linkages among factors were from (a) attendance ability to training participation, (b) willingness to participate to training participation, (c) job satisfaction to willingness to participate, (d) external expectations to willness to participate, (e) personal characteristics (education) to values and internal expectations, and (f) personal characteristics (age) to expectations. Weak causal coefficients in four linkages raise a question: Do these linkages actually not exist?

Partial correlations were used to determine whether or not relationships

existed among the factors where they should not have. Seven of the twenty-one unpredicated relationships were statistically sound. These linkages are from (a)attendance ability to willingness to participate, (b) willingness to participate to attendance ability, (c) job satisfaction to attendance ability, (d) attendance ability to job satisfaction, (e) personal characteristics (tenure) to job satisfaction, (f) job satisfaction to personal characteristics (tenure), and (g) external expectations to attendance ability. It is possible that these linkages should be added to the Steers and Rhodes (1978) model.

In summary, the findings of this study suggest that job satisfaction and external expectations are significant factors that may be changed to infulence electronics technicians' willingness to participate in work-related training. Ability to attend is a basic factor that may be changed to influence training participation.

IMPLICATIONS

The willingness of electronics technicians to participate in work-related training is influenced by three factors. These factors are external expectations, values and internal expectations, and ability to attend. Providing technicians with actual and perceived ability to participate in work-related training is most influential. Job satisfaction and external expectations directly influence verbalized willingness to participate in work-related training. Values and internal expectations influence job satisfaction.

Procedures that could be taken by companies for enhancing external expectations range from encouraging the significant others (colleagues and supervisors) to influence technicians to attend work-related training to actively providing in-plant work-related training. On the values and internal expectations dimension, procedures would include providing opportunities for advancement and better incentive systems. Reducing restrictions on participation, providing flexible time to attend, and paying for training costs may be effective ways of increasing electronics technicians' ability to attend, and, therefore encouraging them to participate in work-related training. Eventually, work-related training could

help electronics technicians pursue individual excellence and improve their productivity.

Finally, the subjects' participation in work-related training was based upon their actual experience during the past five years. Yet, items on ability to attend work-related training were oriented toward future participation. It is therefore recommended that the linkages be reexamined by using longitudinal data on participation in work-related training.

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